

FIG.1

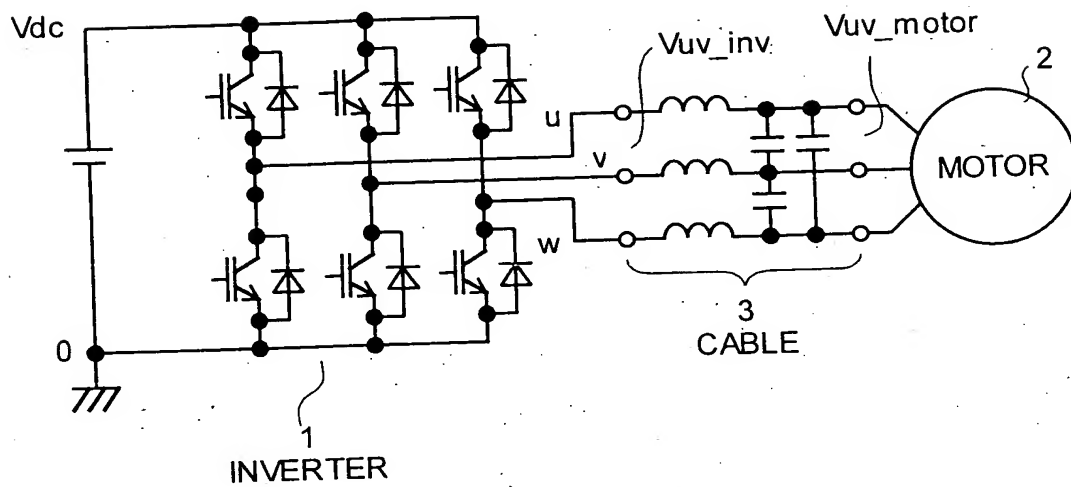


FIG.2

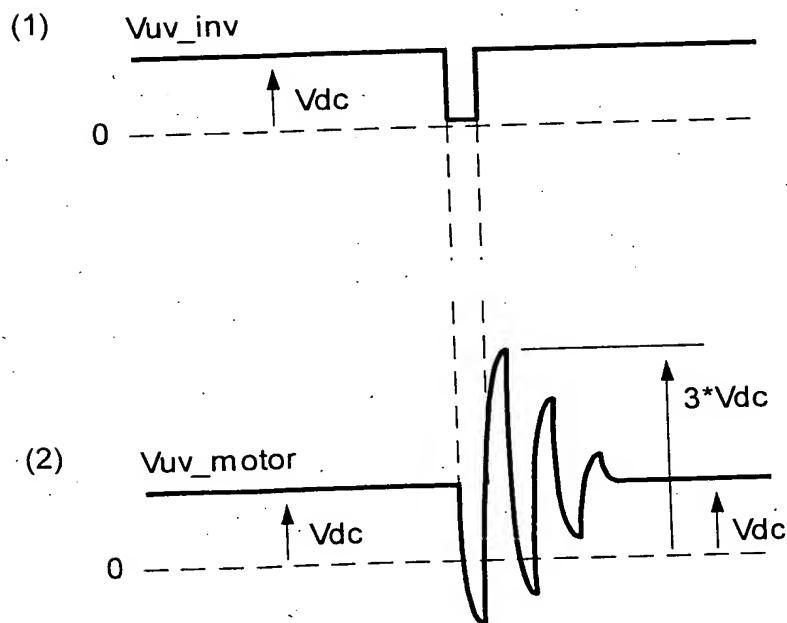


FIG.3

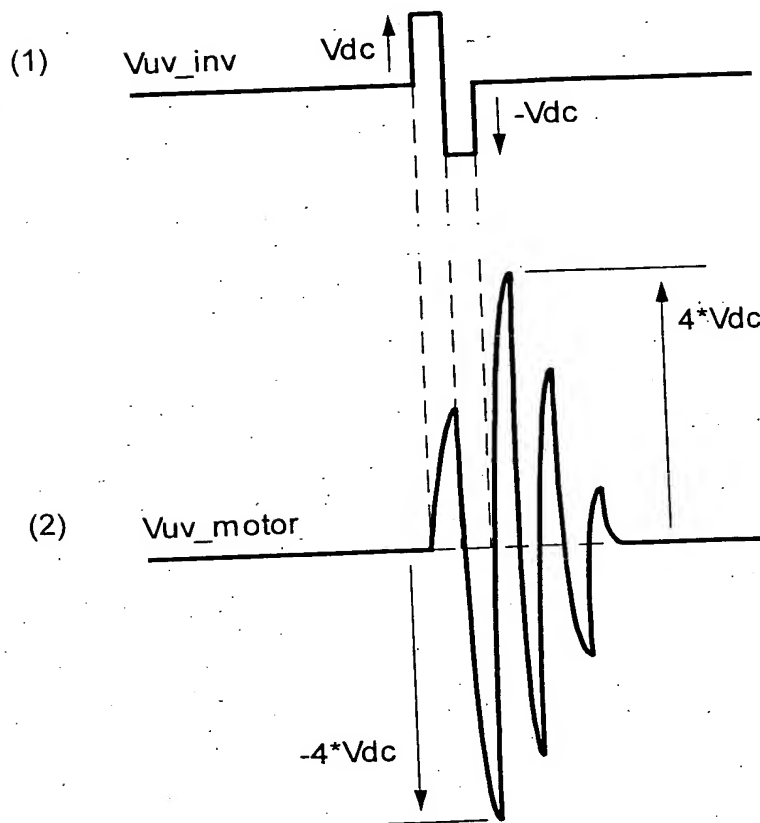


FIG.4

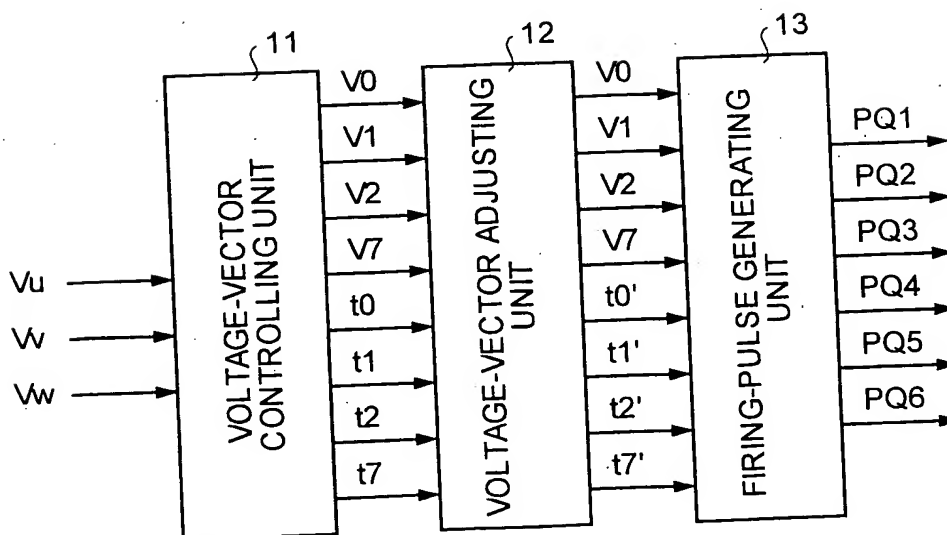


FIG.5

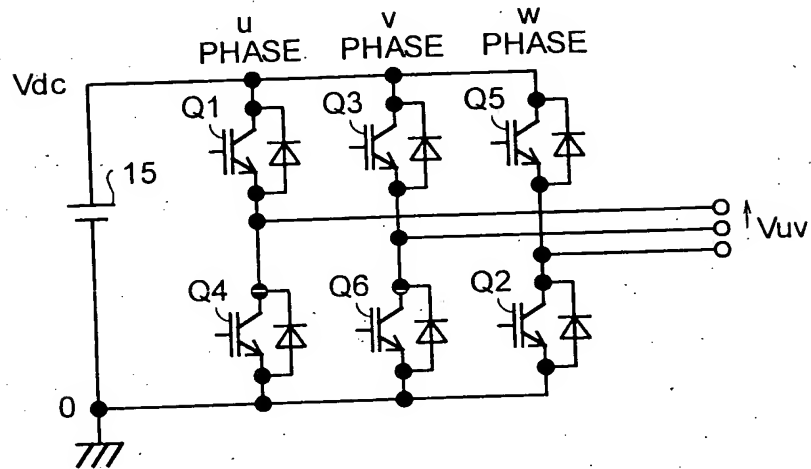


FIG.6

| STATE | TURNED-ON IGBT | | | VOLTAGE VECTOR |
|-------|----------------|---------|---------|----------------|
| | u PHASE | v PHASE | w PHASE | |
| 0 | Q4 | Q6 | Q2 | V0 |
| 1 | Q1 | Q6 | Q2 | V1 |
| 2 | Q1 | Q3 | Q2 | V2 |
| 3 | Q4 | Q3 | Q2 | V3 |
| 4 | Q4 | Q3 | Q5 | V4 |
| 5 | Q4 | Q6 | Q5 | V5 |
| 6 | Q1 | Q6 | Q5 | V6 |
| 7 | Q1 | Q3 | Q5 | V7 |

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FIG.7

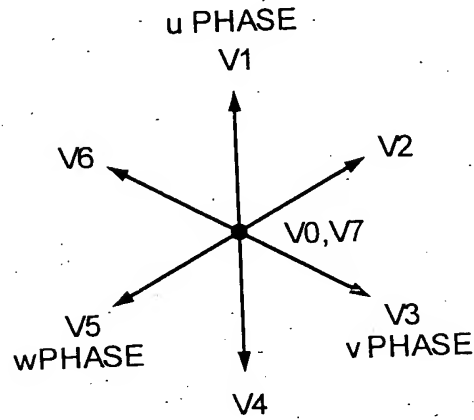


FIG.8

| PHASE θ | VOLTAGE VECTOR |
|-------------------------------|----------------|
| $0 \leq \theta < \pi/3$ | V1, V2, V0, V7 |
| $\pi/3 \leq \theta < 2\pi/3$ | V2, V3, V0, V7 |
| $2\pi/3 \leq \theta < \pi$ | V3, V4, V0, V7 |
| $\pi \leq \theta < 4\pi/3$ | V4, V5, V0, V7 |
| $4\pi/3 \leq \theta < 5\pi/3$ | V5, V6, V0, V7 |
| $5\pi/3 \leq \theta < 2\pi$ | V6, V1, V0, V7 |

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FIG.9

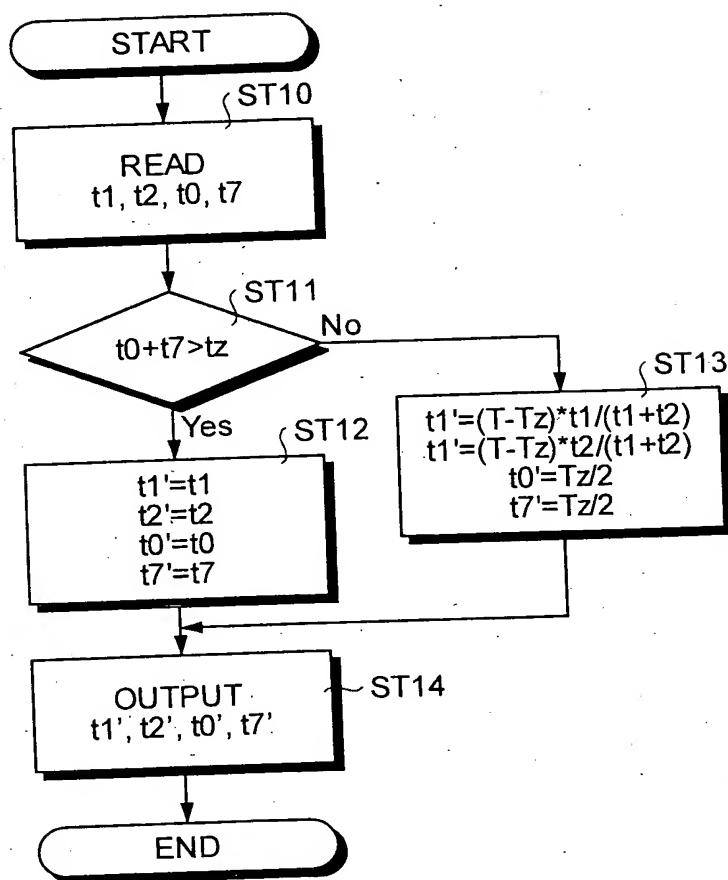
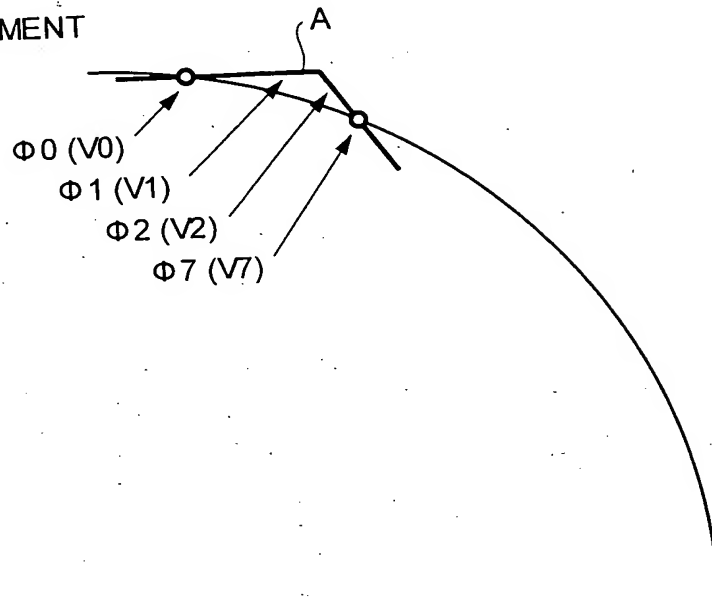
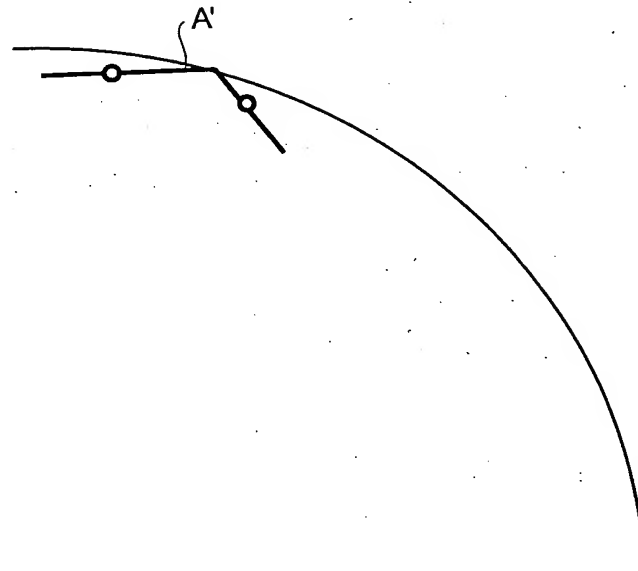


FIG.10

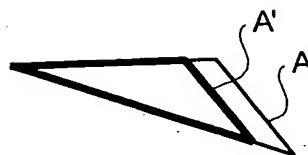
(1) BEFORE ADJUSTMENT



(2) AFTER ADJUSTMENT



(3) COMPARE



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FIG.11

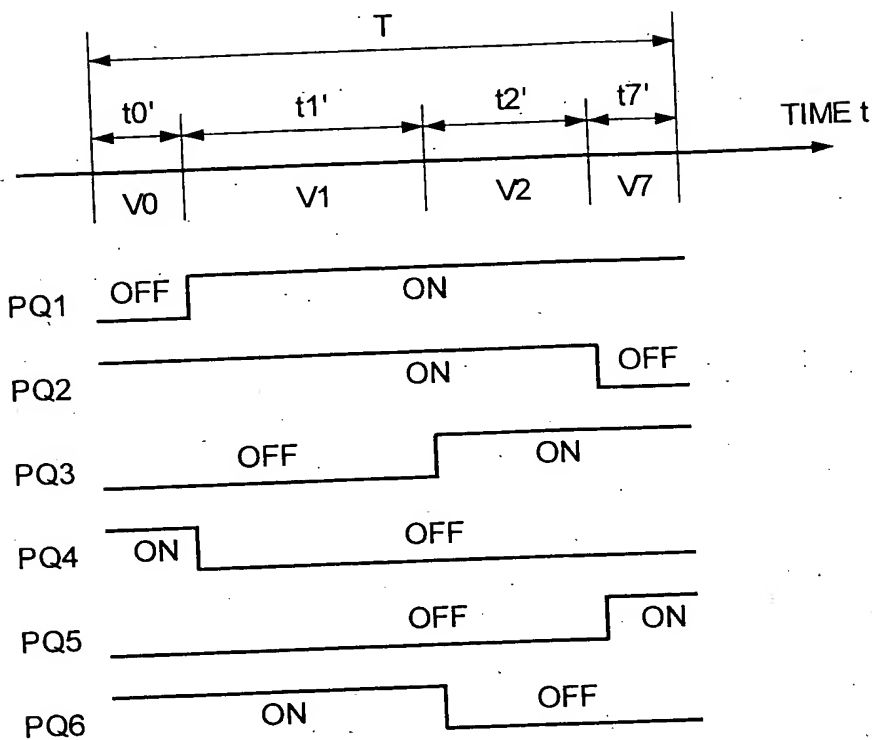
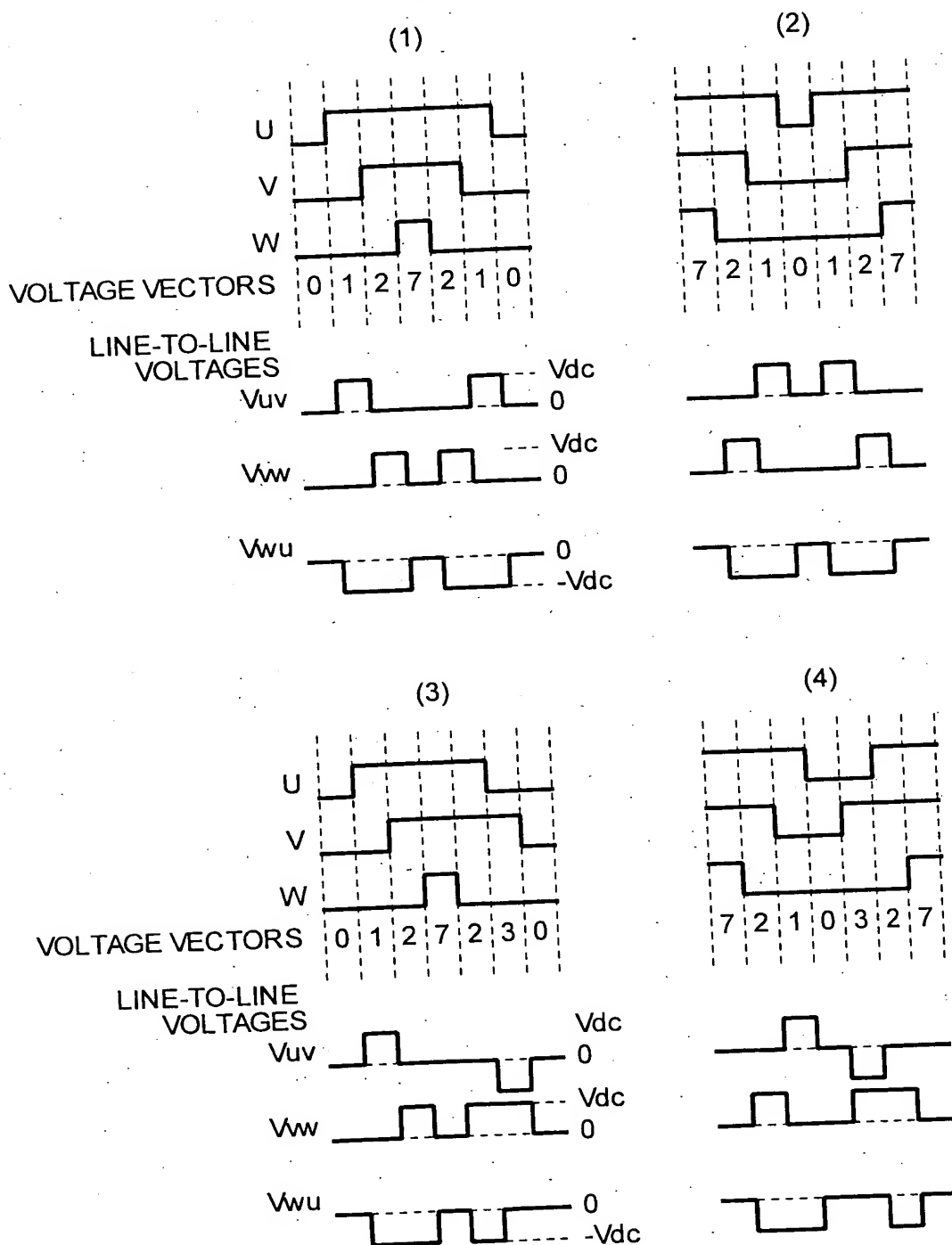
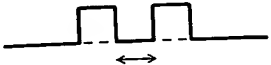



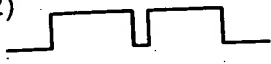

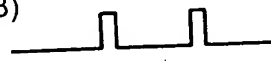
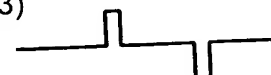




FIG. 12



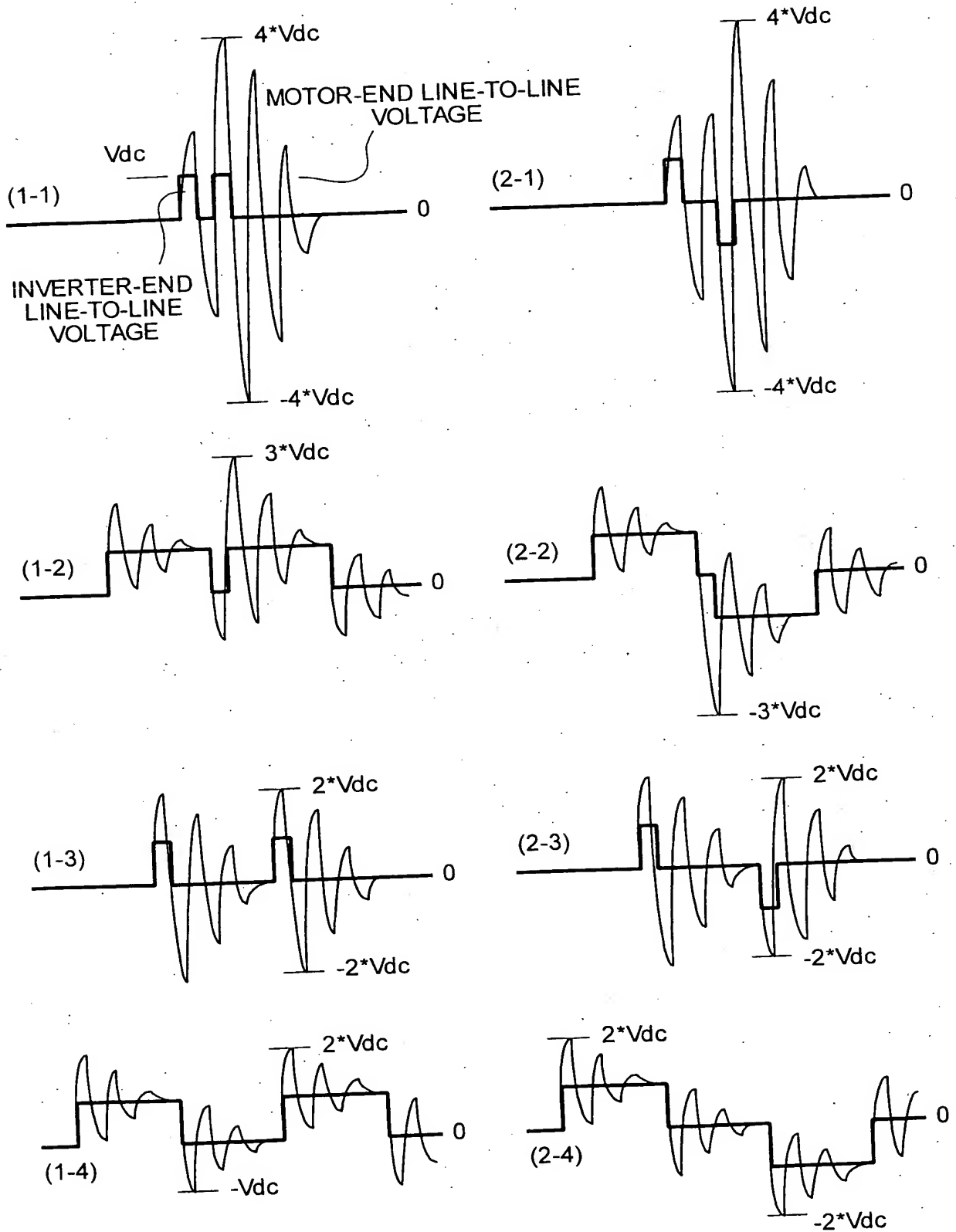
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FIG.13

| OUTPUT TIME OF ZERO- VOLTAGE VECTORS | OUTPUT TIME OF VOLTAGE VECTORS OTHER THAN ZERO- VOLTAGE VECTORS | LINE-TO-LINE VOLTAGE PATTERN 1  ZERO-VOLTAGE VECTOR | LINE-TO-LINE VOLTAGE PATTERN 2  ZERO-VOLTAGE VECTOR |
|---|---|---|--|
| SHORT | SHORT | (1-1)  | (2-1)  |
| SHORT | LONG | (1-2)  | (2-2)  |
| LONG | SHORT | (1-3)  | (2-3)  |
| LONG | LONG | (1-4)  | (2-4)  |

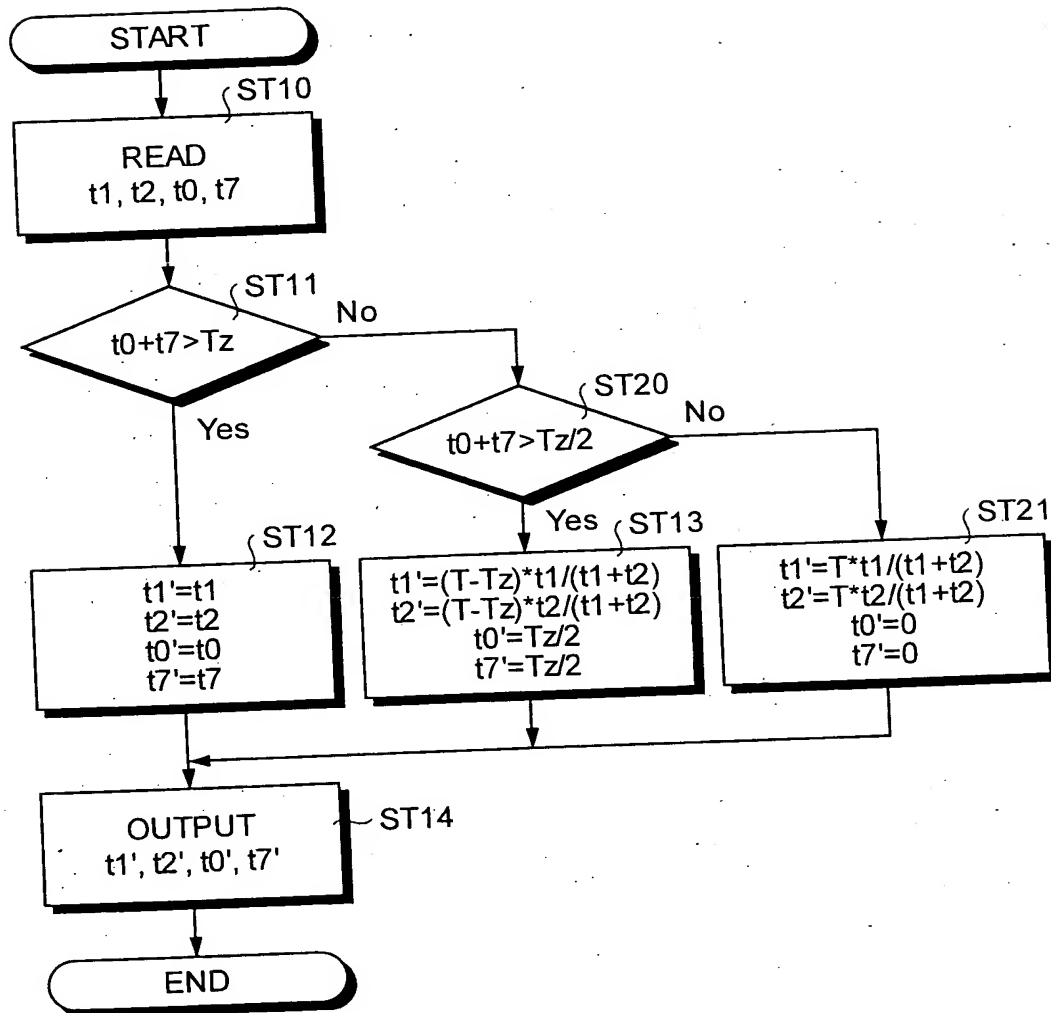
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FIG.14



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FIG.15



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FIG.16

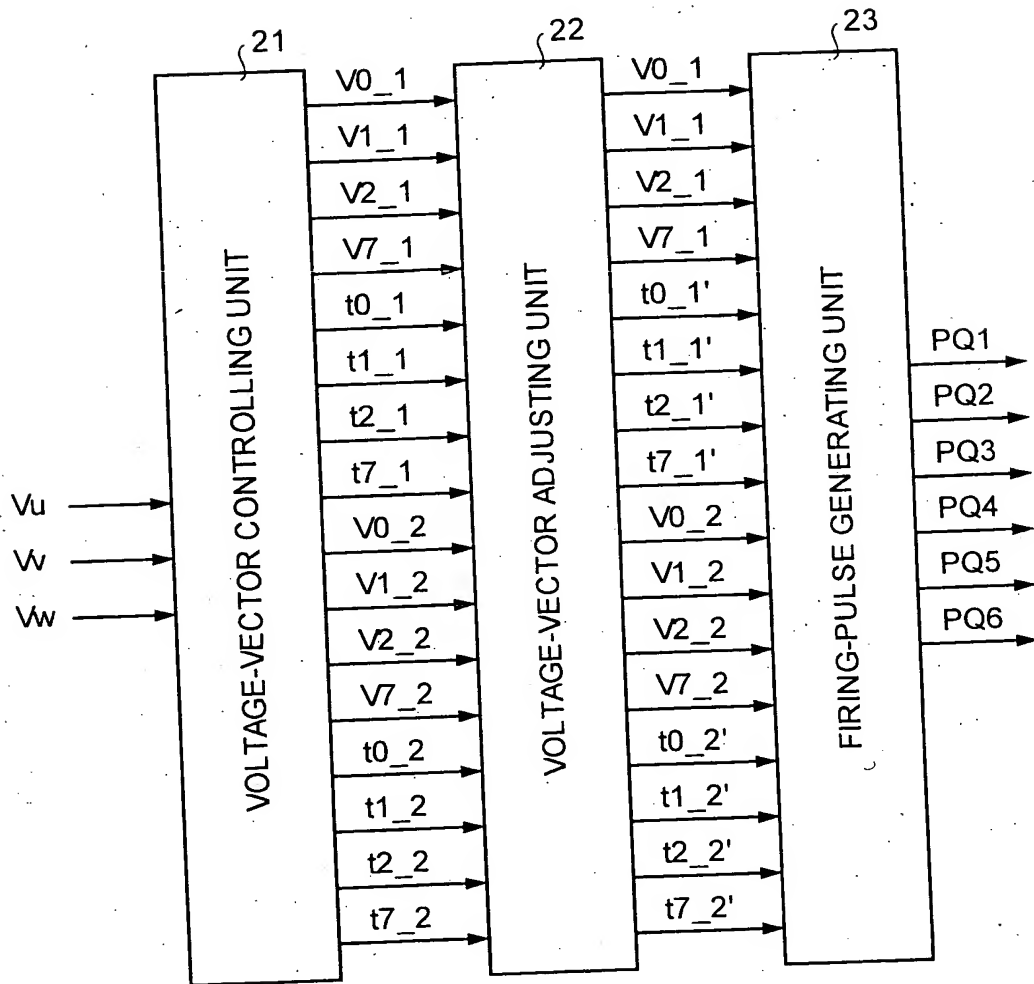
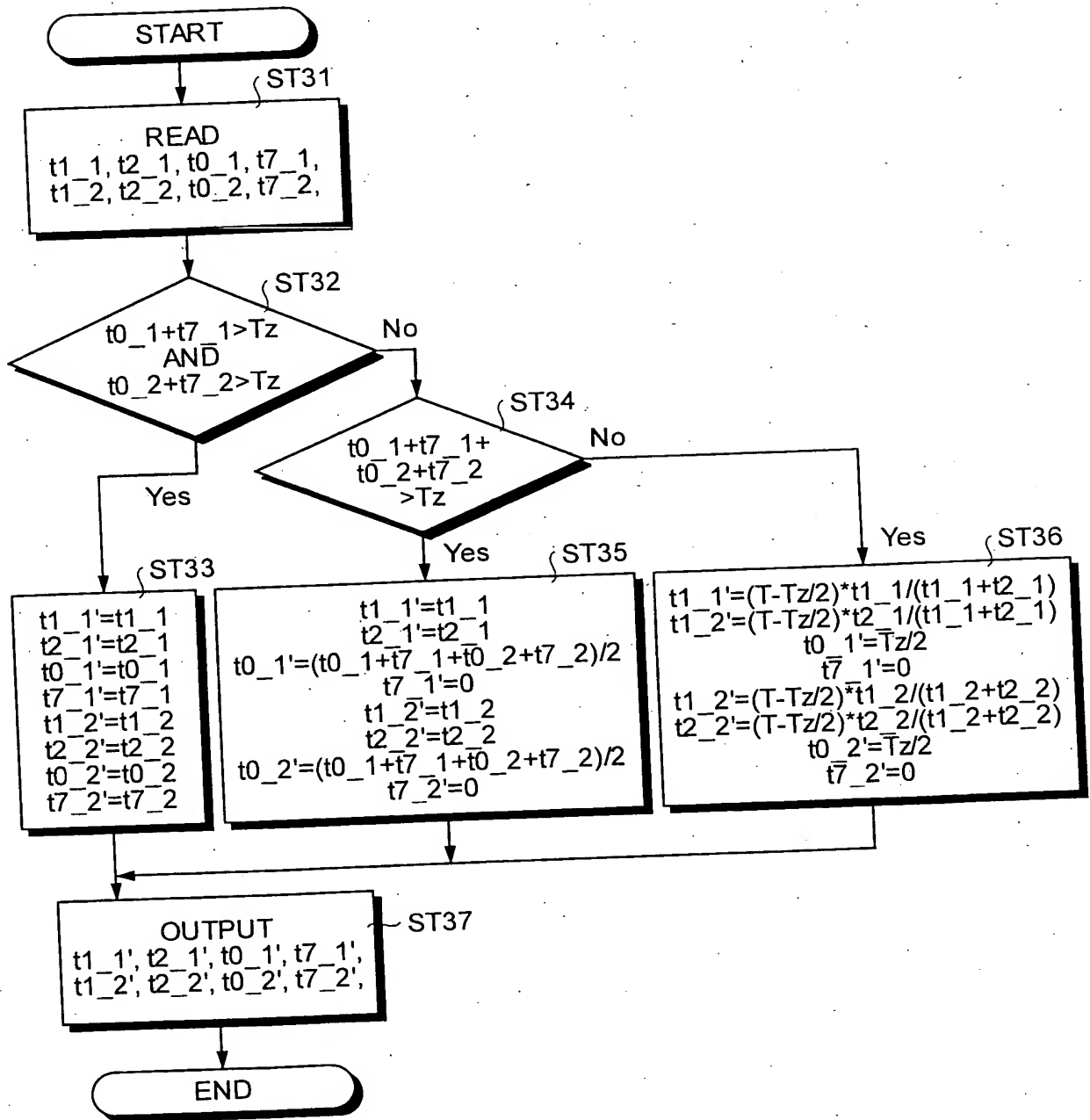
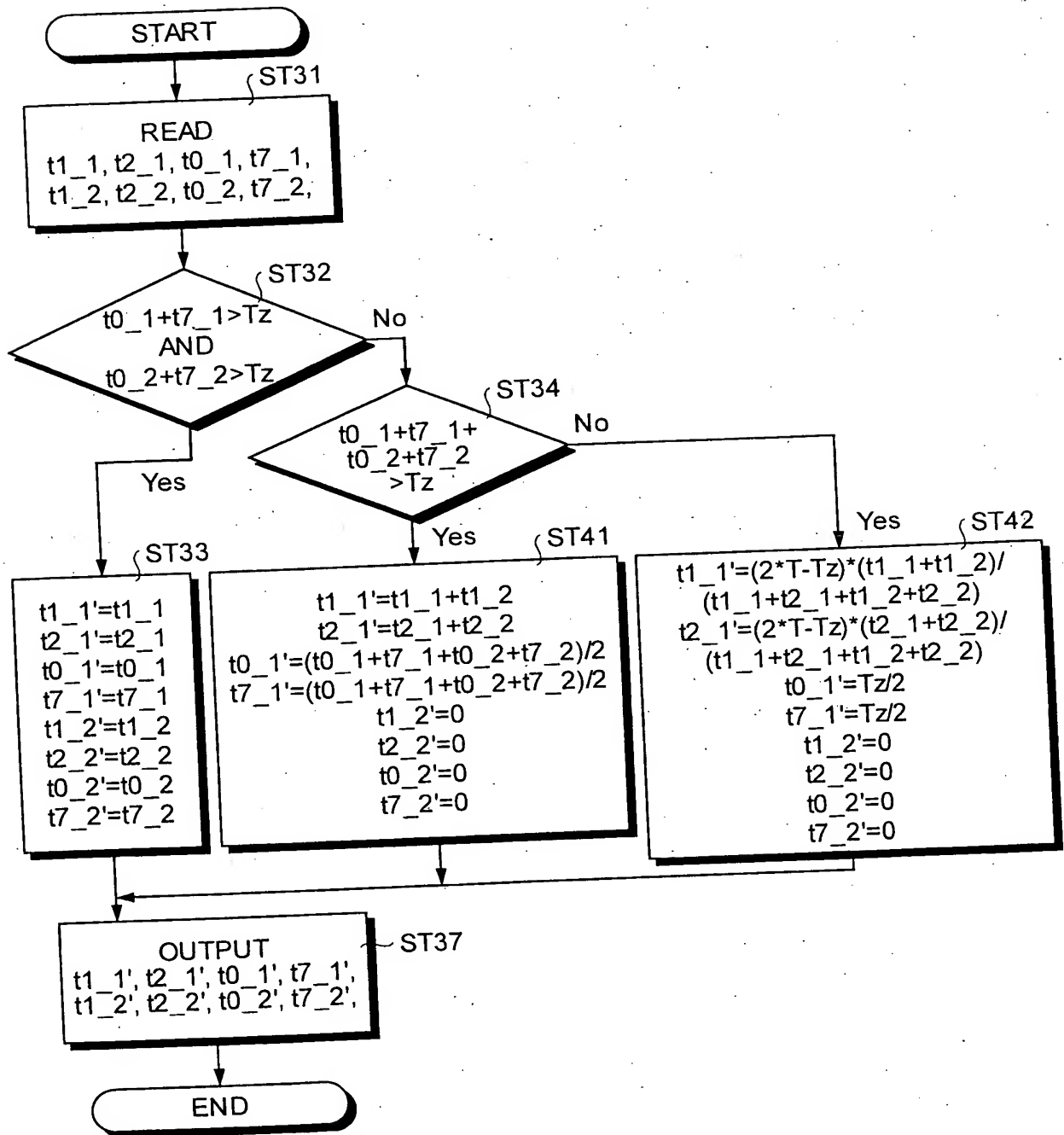


FIG.17



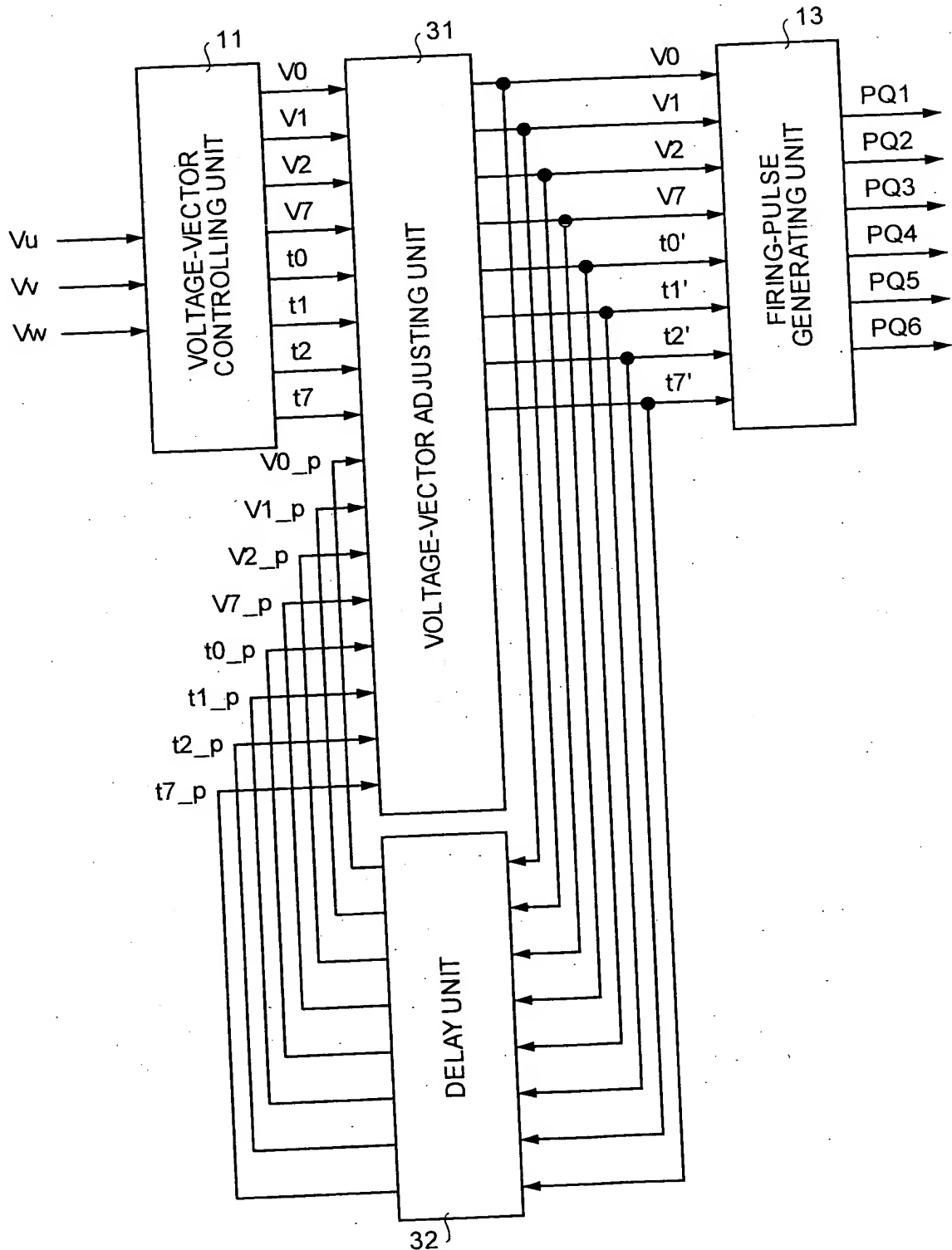
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FIG.18



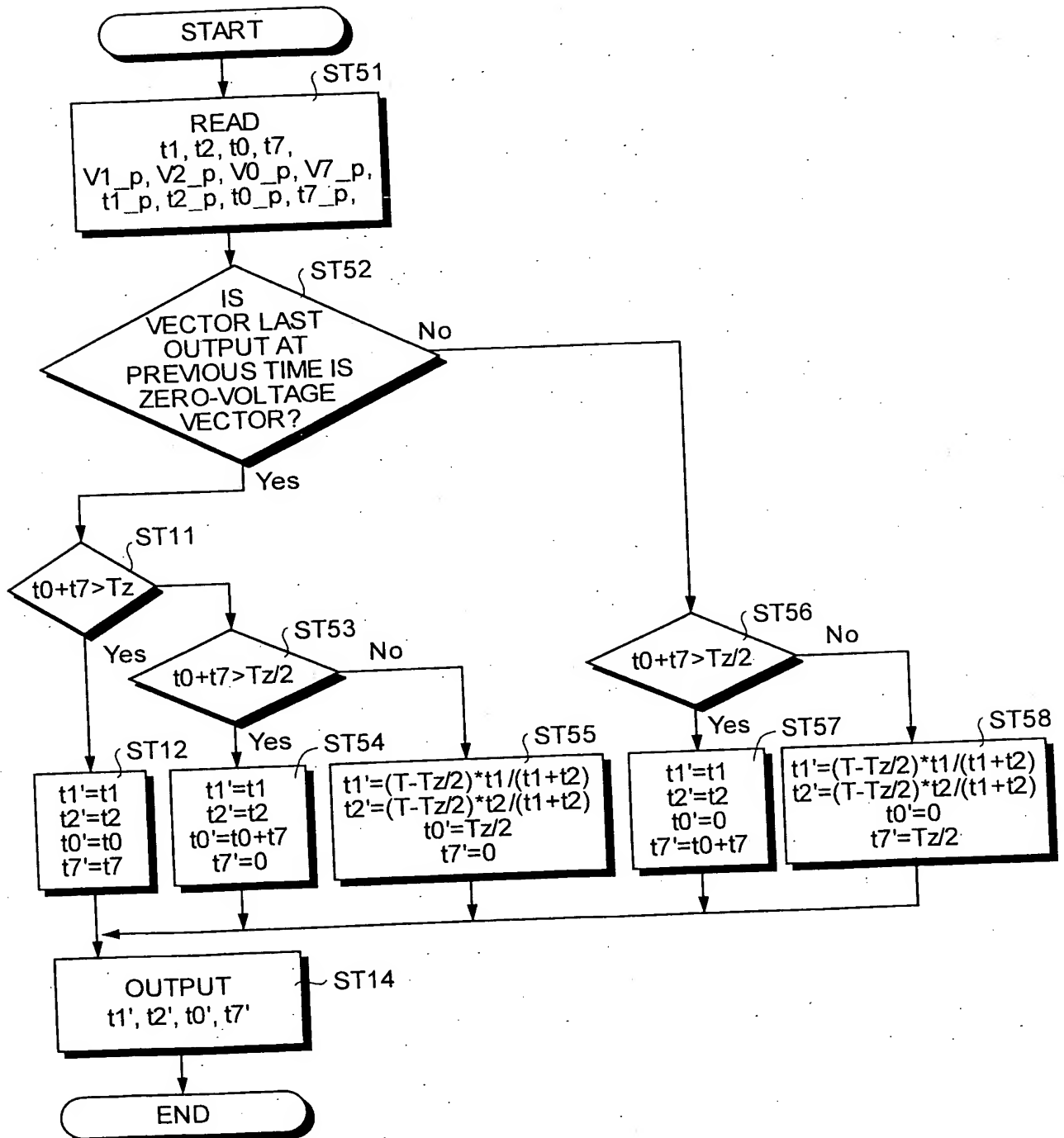
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FIG. 19



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FIG.20



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FIG.21

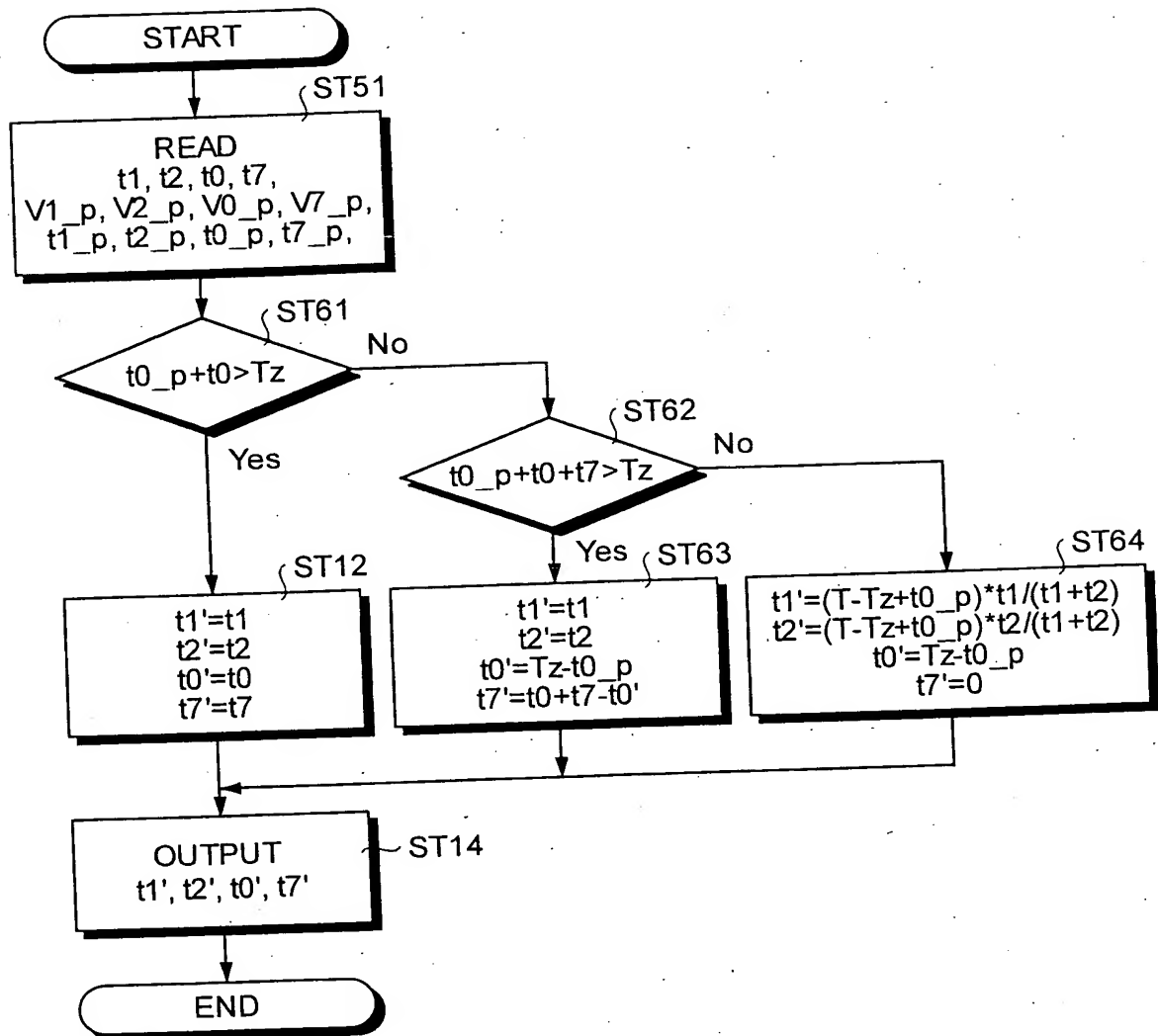


FIG.22

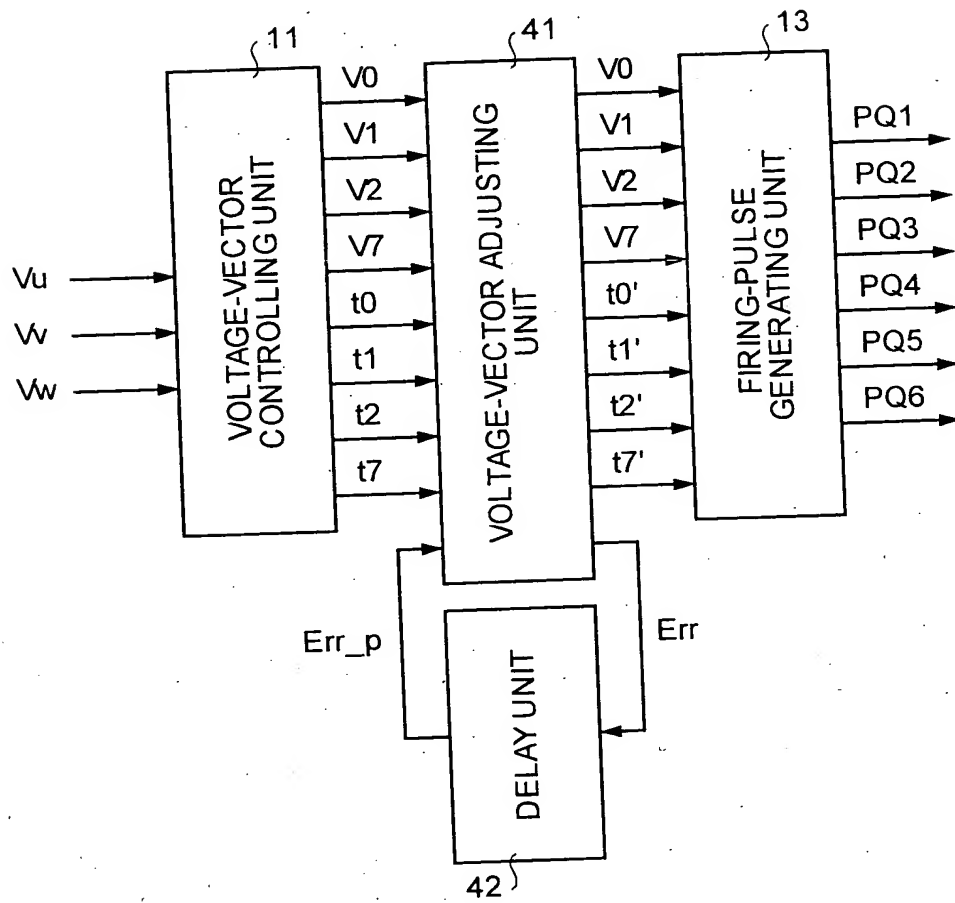
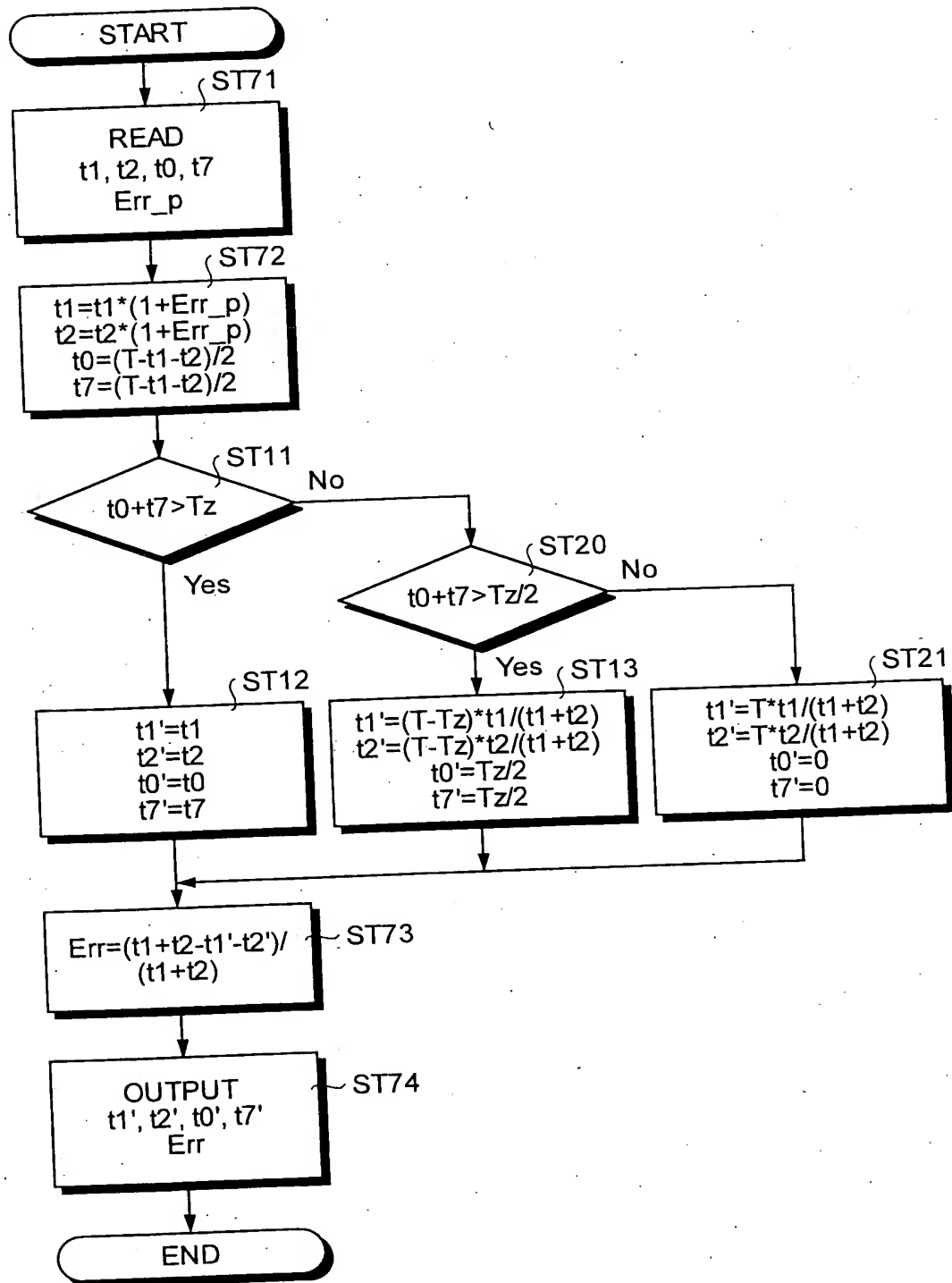


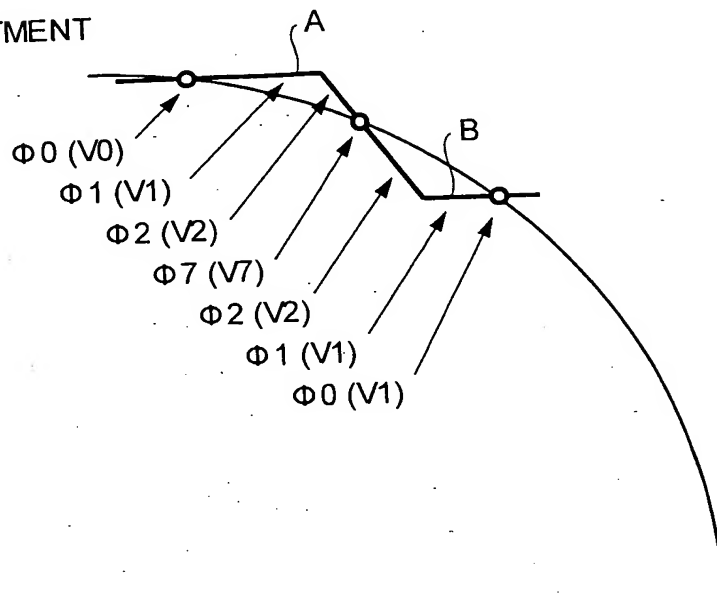
FIG.23



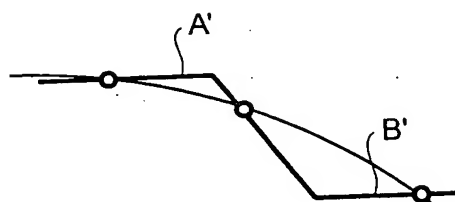
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FIG. 24

(1) BEFORE ADJUSTMENT



(2) AFTER ADJUSTMENT



(3) COMPARE

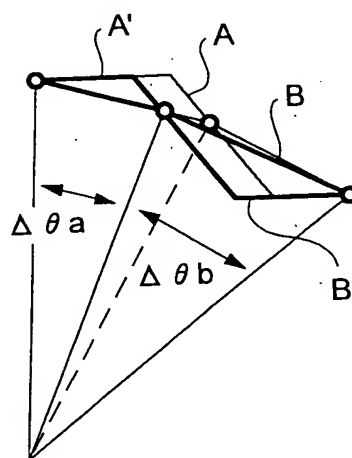
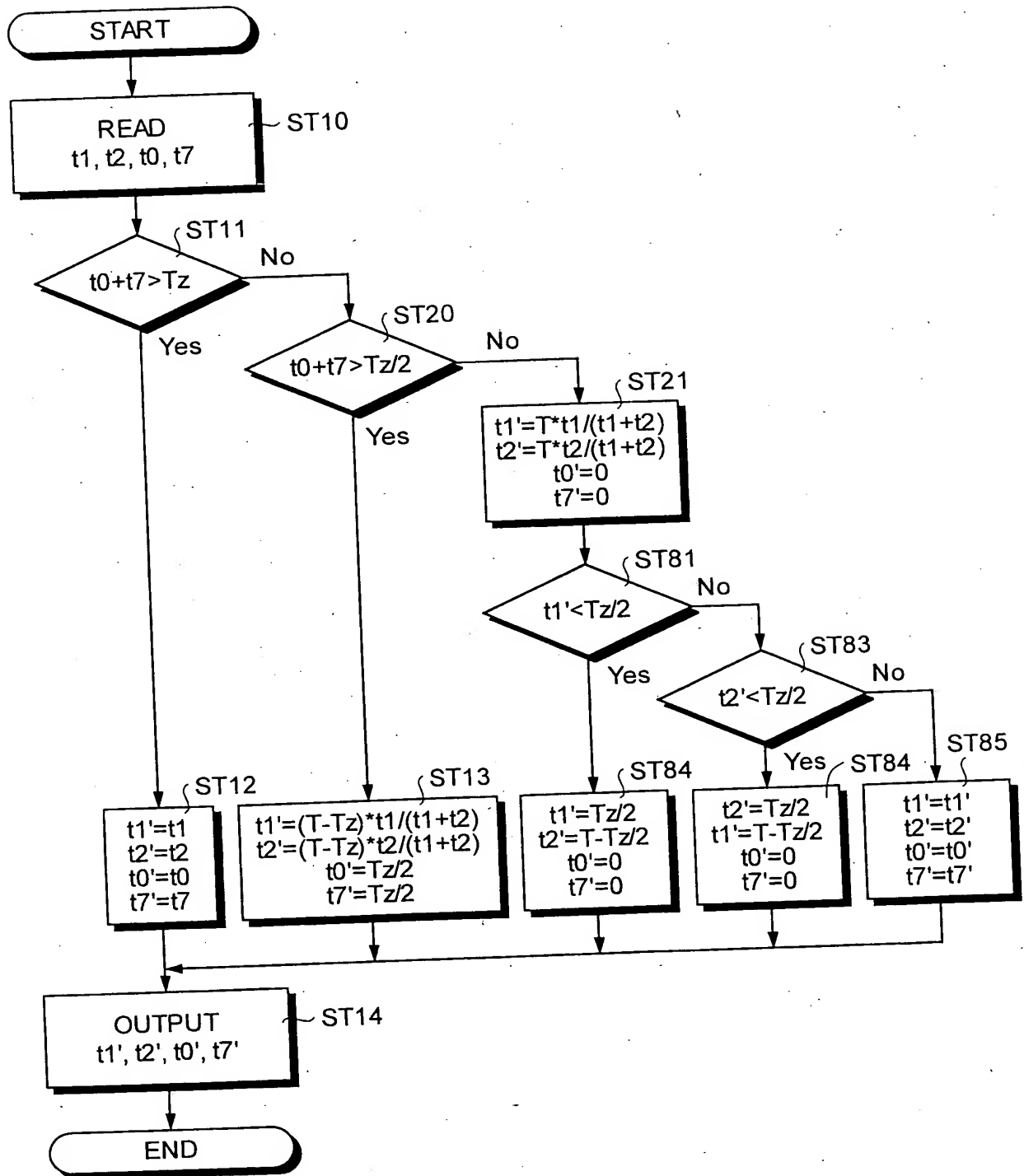


FIG.25



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FIG.26

